Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Diagnostic imaging: median dose length product (DLP) for CT abdomen-pelvis with contrast (single phase scan).

Source(s)

American College of Radiology (ACR). National Radiology Data Registry: qualified clinical data registry. Non-PQRS measures. Reston (VA): American College of Radiology (ACR); 2015 Mar. 49 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Use of Services

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the median dose length product (DLP) for computed tomography (CT) abdomen-pelvis with contrast (single phase scan).

Measure calculated at facility/group level (National Provider Identifier [NPI]/Taxpayer Identification Number [TIN]) with rate assigned to all physicians within the facility/group who interpret CTs.

Rationale

The determination of ionizing radiation dose to a living human is very complex and poses many challenges for referring physicians, radiologists, radiologic technologists, medical physicists, equipment vendors, regulators, and patients. To determine the absorbed radiation dose, the initial x-ray beam exposure and the absorption in each organ must be known. It is the latter quantity that complicates this determination. This absorption is dependent on the amount and properties of each tissue encountered by the x-ray beam, and these parameters vary widely among patients. The situation is further complicated

because it is not practical to insert radiation detectors into each organ of every patient. It is important to understand that the reported numerical values for individual radiation doses may vary by factors of 5 to 10 depending on individual patients and the manner of image acquisition.

There are many challenges in dose monitoring, including collection of accurate data with minimal effort on the part of the facility, standardization of procedure names so that benchmarks can be applied appropriately, and adjustment for patient sizes. Dose registries would enable facilities to compare their radiation doses to those delivered in other facilities for the same exam, and such comparisons over time could assist in optimizing patient radiation doses for medical imaging. The goals of tracking imaging exams and the associated radiation exposure include: 1) providing information at the point-of-care for the referring practitioner (i.e., supporting justification); 2) promoting development and use of diagnostic reference levels (DRLs) (i.e., supporting optimization); 3) providing information for assessment of radiation risks; and 4) establishing a tool for use in research and epidemiology.

There has been a considerable rise in use of computed tomography (CT) over the past 10 years. With that, there is also a significant increase in the population's cumulative exposure to ionizing radiation. A CT study should use as little radiation as possible, while still meeting the image quality needs of the exam. Dose length product (DLP) is a standardized parameter to measure scanner radiation output to a patient and is a useful index to compare protocols across different practices and scanners. Providing comparative data across exam types to a physician or site will help adjust imaging protocols to obtain diagnostic images using the lowest reasonable dose. This measures the CT scanner radiation output specific to a patient and exam, comparing and benchmarking the actual dose index delivered to patients. While DLP itself is not a measure or estimate of actual patient radiation dose, it is closely related to doses received by patients. DLP is a measure of scanner output received and experienced by patients and not simply documentation of whether DLP was recorded.

This measure is calculated at the facility level because protocol optimization is the combined effort of physicians, medical physicists and technologists in the practice, and change needs to be driven by the interpreting physicians as a team.

Evidence for Rationale

ACRâ€“AAPM practice guideline for diagnostic reference levels and achievable doses in medical x-ray imaging. Reston (VA): American College of Radiology (ACR); 2013.

American College of Radiology (ACR). National Radiology Data Registry: qualified clinical data registry. Non-PQRS measures. Reston (VA): American College of Radiology (ACR); 2015 Mar. 49 p.

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Brody AS, Frush DP, Huda W, Brent RL, American Academy of Pediatrics Section on Radiology. Radiation risk to children from computed tomography. Pediatrics. 2007 Sep;120(3):677-82. PubMed

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Goske MJ, Strauss KJ, Coombs LP, Mandel KE, Towbin AJ, Larson DB, Callahan MJ, Darge K, Podberesky DJ, Frush DP, Westra SJ, Prince JS. Diagnostic reference ranges for pediatric abdominal CT. Radiology. 2013 Jul;268(1):208-18. PubMed

Lukasiewicz A, Bhargavan-Chatfield M, Coombs L, Ghita M, Weinreb J, Gunabushanam G, Moore CL. Radiation dose index of renal colic protocol CT studies in the United States: a report from the American College of Radiology National Radiology Data Registry. Radiology. 2014 May;271(2):445-51. PubMed

National Cancer Institute (NCI). Radiation risks and pediatric computed tomography: a guide for health care providers. [internet]. Bethesda (MD): National Institutes of Health (NIH); 2012 Jun 7.

Radiation risks of diagnostic imaging. Sentinel Event Alert. 2011 Aug 24;(47):1-4. PubMed

Smith-Bindman R, Lipson J, Marcus R, Kim KP, Mahesh M, Gould R, Berrington de Gonzalez A, Miglioretti DL. Radiation dose associated with common computed tomography examinations and the associated lifetime attributable risk of cancer. Arch Intern Med. 2009 Dec 14;169(22):2078-86.

The Joint Commission. Revised requirements for diagnostic imaging services. Oakbrook (IL): The Joint Commission; 2013 Dec 20. 6 p.

U.S. Food and Drug Administration. Initiative to reduce unnecessary radiation exposure from medical imaging. [internet]. Silver Spring (MD): U.S. Food and Drug Administration; 2010 Mar.

Primary Health Components

Abdomen-pelvis computed tomography (CT) with contrast; dose length product (DLP)

Denominator Description

Computed tomography (CT) abdomen-pelvis with contrast (single phase scans)

Numerator Description

Median dose length product (DLP) - sum of the mean DLP values for the exam

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A clinical practice guideline or other peer-reviewed synthesis of the clinical research evidence

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Unspecified

Extent of Measure Testing

The measures in this set are being made available without any prior formal testing. However, these measures are included in the Centers for Medicare and Medicaid Services (CMS) approved American College of Radiology (ACR) National Radiology Data Registry, a CMS Physician Quality Reporting System (PQRS) Qualified Clinical Data Registry since 2014.

The ACR recognizes the importance of thorough testing all of its measures and encourages ongoing robust testing of the ACR National Radiology Data Registry measurement set for feasibility and reliability by organizations or individuals positioned to do so. The ACR will welcome the opportunity to promote such testing of these measures and to ensure that any results available from testing are used to refine the measures on an ongoing basis. Since these measures are in use for quality improvement and reporting, we can support data analysis of registry data to perform the testing, such as evaluation of gaps for validity testing, and signal-to-noise estimation for reliability testing.

Evidence for Extent of Measure Testing

Blakey A. (Administrator, Quality Management Programs, American College of Radiology, Reston, VA). Personal communication. 2016 Mar 7. 1 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory/Office-based Care

Ambulatory Procedure/Imaging Center

Hospital Inpatient

Hospital Outpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Clinical Practice or Public Health Sites

Statement of Acceptable Minimum Sample Size

Unspecified

Target Population Age

Unspecified

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Unspecified

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Diagnostic Evaluation

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
Computed tomography (CT) abdomen-pelvis with contrast (single phase scans)

Exclusions
None

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
Median dose length product (DLP) - sum of the mean DLP values for the exam

Exclusions
Unspecified

Numerator Search Strategy

Fixed time period or point in time

Data Source

Registry data

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Mean/Median

Interpretation of Score

Does not apply to this measure (i.e., there is no pre-defined preference for the measure score)

Allowance for Patient or Population Factors

not defined yet

Standard of Comparison

not defined yet

Identifying Information

Original Title

Median dose length product for CT abdomen-pelvis with contrast (single phase scan).

Measure Collection Name

National Radiology Data Registry Measurement Set

Submitter

American College of Radiology - Medical Specialty Society

Developer

American College of Radiology - Medical Specialty Society

Funding Source(s)

None

Composition of the Group that Developed the Measure

The American College of Radiology (ACR) National Radiology Data Registry (NRDR) helps facilities benchmark outcomes and process-of-care measures and to develop quality improvement programs. The composition of the workgroup is has representation from each of our six data registries:

CT Colonography Registry Committee (CTC)
Dose Index Registry Committee (DIR)
General Radiology Improvement Database Committee (GRID)
National Mammography Database Committee (NMD)
Lung Cancer Screening Registry Committee (LCSR)
IR & INR Registries (Interventional Radiology)

Committee Members

Morin Richard, PhD, FACR, Chair of NRDR

Kalpana Kanal, PhD, Chair of DIR
Zuley Margarita, MD, Chair of NMD
Abe Dachman, MD, Chair of CTC Committee
Frank Rybicki, MD, Chair of Metrics Committee
Siegel Eliot, MD, RSNA Liaison
Chad Calendine, MD, Co-Chair of GRID
Geoffrey Wiot, Co-Chair of GRID
Jeremy Durack, Chair of IR Registry Committee
Ella Kazerooni, Co-Chair of Lung-Cancer Screening Committee
Deni Aberle, Co-Chair of Lung-Cancer Screening Committee

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Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Mar

Measure Maintenance

This measure is reviewed annually

Date of Next Anticipated Revision

2017 Mar

Measure Status

This is the current release of the measure.

Measure Availability

Source available from the American College of Radiology (ACR) Web site .

For more information, contact ACR at 1891 Preston White Drive, Reston, VA 20191; Phone: 703-648-8900; E-mail: nrdr@acr.org; Web site: www.acr.org .

NQMC Status

This NQMC measure summary was completed by ECRI Institute on December 11, 2015. The information

was verified by the measure developer on March 7, 2016.

Copyright Statement

This NQMC summary is based on the original measure, which is subject to the measure developer's copyright restrictions.

Production

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